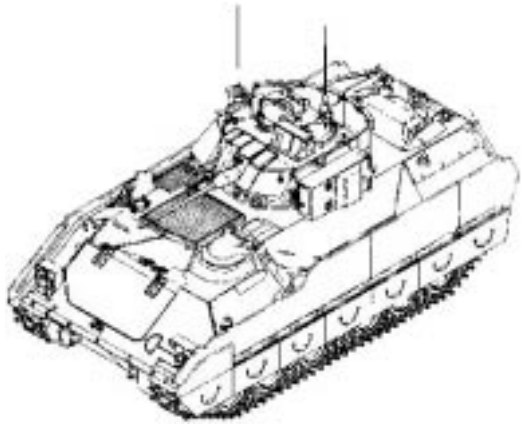
JOB PERFORMANCE AID HANDBOOK

PRECISION GUNNERY SYSTEM (PGS)

FOR
FIGHTING VEHICLE, INFANTRY: M2, M2A2, AND M2A2 ODS
FIGHTING VEHICLE, CAVALRY: M3, M3A2, AND M3A2 ODS



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This manual supersedes Job Performance Aid Handbook dated 15 May 1995.

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HEADQUARTERS, DEPARTMENT OF THE ARMY

1 OCTOBER 1998

FOR INFORMATION ON FIRST AID, REFER TO FM 21-11.

WARNING

Vehicle master switch and turret power must be OFF and turret drive lock must be in LOCKED position before connecting or disconnecting system components/ cables. Failure to follow this warning may cause turret or 25 mm gun movement, resulting in injury or death to personnel.

WARNING

Ensure cables and components are properly installed. Improper installation can cause equipment damage or injury to personnel.

WARNING

Transceiver unit has a laser safety Class 3A which means it is conditionally eye safe.

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FOR
FIGHTING VEHICLE, INFANTRY: M2, M2A2, AND M2A2 ODS
FIGHTING VEHICLE, CAVALRY: M3, M3A2, AND M3A2 ODS

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

1-1. GENERAL.

a. This Job Performance Aid Handbook is intended for use by trained Precision Gunnery System (PGS) personnel. The handbook serves as a handy memory jogger to assist trained operators with required procedures.

b. Refer to TM 9-6920-710-12&P-1 for more information on PGS and refer to TM 9-6920-711-12&P-1 for more information on CGUN/TDRS.

1-2. EQUIPMENT DESCRIPTION.

a. **Purpose of PGS.** The PGS is a vehicle-mounted training device that assists the BFV crew in gaining and improving proficiency in gunnery skills without the expenditure of live ammunition. Gunnery and tactical training can be conducted anywhere that eye-safe laser firing is permitted. PGS provides the crew with visual and sound effects to accurately simulate real firing conditions.

b. **Functional Configuration.** The PGS simulates the firing of the BFV's 25 mm gun, the firing of the coaxially-mounted machine gun, the firing of the TOW missile system, and the effects of a target vehicle being hit. The PGS consists of three subsystems: firing system, target system, and Training Data Retrieval System (TDRS).

(1) **Firing System.** PGS simulates the firing ballistic and missile characteristics of ammunition and the visual and sound effects of firing.

(2) **Target System**. The target system receives firing information from an attacking weapon, equipped with a laser training device, and notifies the crew of the effects of the attack. The attack could come from another PGS-equipped vehicle, a Tank Weapon Gunnery Simulation System (TWGSS)-equipped tank, or a Multiple Integrated Laser Engagement System (MILES)-equipped unit. An instructor using the control gun (CGUN) can also communicate with the PGS target system.

(3) **TDRS.** The TDRS is used to evaluate the effectiveness of the firing engagements whether in a precision gunnery exercise or a tactical training environment. The TDRS provides real time analysis for each round fired and engagement undertaken. For more information on TDRS, refer to TM 9-6920-711-12&P-1.

c. **Features and Capabilities.**

(1) Simulates vehicle firing and ammunition effect on targets.

(2) Provides full fire control interface to enable the vehicle crew to train using normal engagement techniques.

(3) Provides training capabilities utilizing Class 3A (conditionally eye safe) eye-safe laser.

(4) Interoperable and compatible with TWGSS, MILES, and Laser Target Interface Devices (LTIDs).

NOTE

See TM 9-6920-710-12&P-1 for detailed information on TOW ONLY mode, scaled gunnery, aux-sight gunnery or tracking training.

(5) Provides panel gunnery training, target tracking training, 1/10 and 1/2 scale target capability, and force-on-force training in a realistic environment with immediate feedback.

1-2. EQUIPMENT DESCRIPTION (Con't).

(6) Simulates the visual effects of the 25 mm gun, coaxially-mounted machine gun, and TOW missile. These simulations include tracer, tracer burst on target, burst on ground, and obscuration images.

(7) Provides firing sound effects over vehicle intercom. These sound effects include:

(a) 25 mm gunfire signature

(b) Coax gunfire signature

(c) TOW firing signature

(d) Hit indications

(e) System error indication

(8) Provides and stores continuously updated vehicle position and time data information.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. PREPARATION FOR OPERATION

2-1. PRELIMINARY INSPECTION INSTRUCTIONS.

a. Perform *Before* operation Operator/Crew Preventive Maintenance Checks and Services (PMCS) (see TM 9-6920-710-12&P-1).

b. Inspect all vehicle connectors for dirt and damage prior to installing system components.

2-2. VEHICLE PREPARATION INSTRUCTIONS.

a. Position Bradley Fighting Vehicle (BFV) on level ground 1200 m from a target panel with an RRU mounted on it. Verify that vehicle is level by commander's or gunner's slope indicators (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

b. Confirm boresight status (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

WARNING

Vehicle master switch and turret power must be OFF and turret drive lock must be in LOCKED position before connecting or disconnecting system components/ cables. Failure to follow this warning may cause turret or 25 mm gun movement, resulting in injury or death to personnel.

c. Turn vehicle master power switch to OFF position (see TM 9-2350-252-10-1 or TM 9-2350-284-10-1). Engage turret traverse lock lever and turn turret power switch to OFF (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

2-2. VEHICLE PREPARATION INSTRUCTIONS (Con't).

d. Remove periscope.

(1) Cut sealant from around base of periscope.

(2) Loosen two screws, release brackets, and remove blackout cover bracket from turret. Remove periscope.

e. Remove gunner's and commander's brow pad and eye cushion.

(1) Remove pin. Remove brow pad and eye cushion from gunner's sight.

(2) Remove pin. Remove brow pad and eye cushion from commander's sight.

f. Remove vehicle floor plate.

(1) Remove four screws, lockwashers, and floor plate from vehicle floor.

(2) Check four DTP connectors for dirt, debris, and damage. Clean connectors as necessary.

g. Install light covers on LO AMMO photoelectric controls.

(1) Install HE light cover over reflector on HE ammo can door. Close velcro to attach.

(2) Insert narrow end of AP light cover between AP LOW AMMO sensor bracket and AP ammo can.

(3) Slide AP light cover upward until it covers light sensor.

(4) Close velcro strap to attach.

(5) Fold and insert coax light cover between two 7.62 mm ammo boxes.

h. Install Thru-Sight Video (TSV) if needed for training (refer to TD 9-6920-708-10 Vol. 1).

2-3. INSTALLATION OF EXTERIOR COMPONENTS.

WARNING

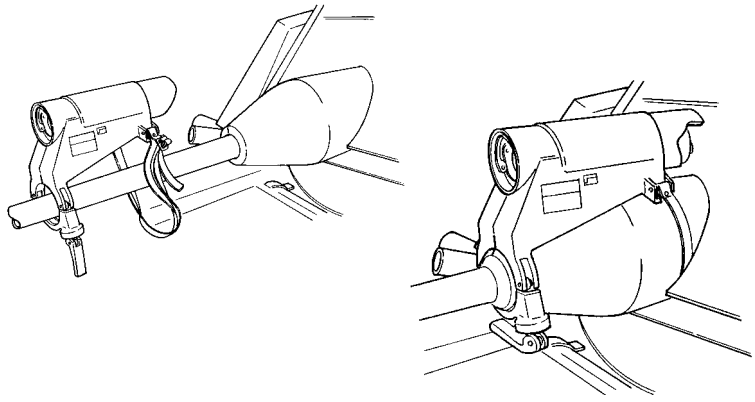
DO NOT install or remove system components or cables unless vehicle master power and turret power switches are in the OFF position and turret traverse lock is engaged. Failure to follow this warning may cause sudden turret or 25 mm gun movement which may result in death or injury to personnel.

a. **Installation of Transceiver Assembly (25 mm Gun).**

CAUTION

Ensure that transceiver unit is properly LOCKED into mounting bracket. Failure to perform this check may result in transceiver unit falling out of mounting bracket.

Install transceiver assembly over end of 25 mm gun barrel and position on top of rotor extension.



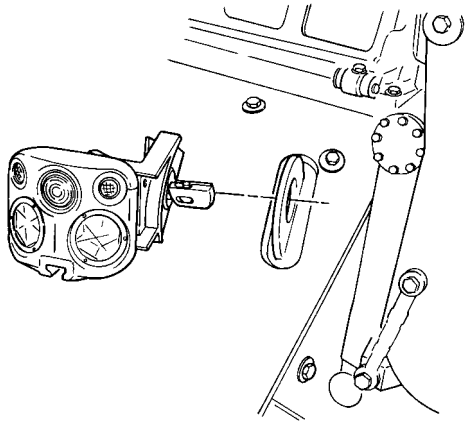
2-3. INSTALLATION OF EXTERIOR COMPONENTS (Con't).

b. **Installation of RDU Assembly (Right- and Left-Front).**

NOTE

Installation of right- and left-front RDU assemblies is similar. Perform these procedures for both RDU assemblies.

Install RDU over turret lifting eye.



2-3. INSTALLATION OF EXTERIOR COMPONENTS (Con't).

c. **Installation of HDDU Assembly (Right- and Left-Front).**

NOTE

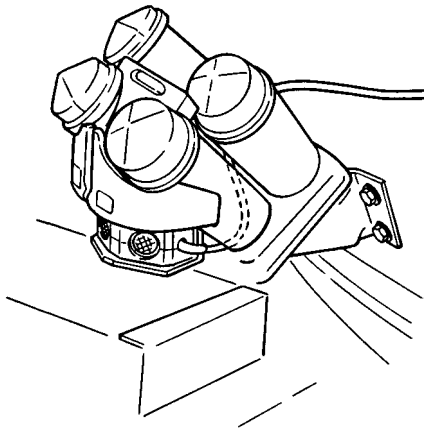
Right- and left-front HDDU assemblies are installed the same way. Perform these procedures for both HDDU assemblies.

(1) Position front HDDU assembly between two lower tubes of smoke grenade launcher.

NOTE

Cable is routed between smoke grenade launcher tubes.

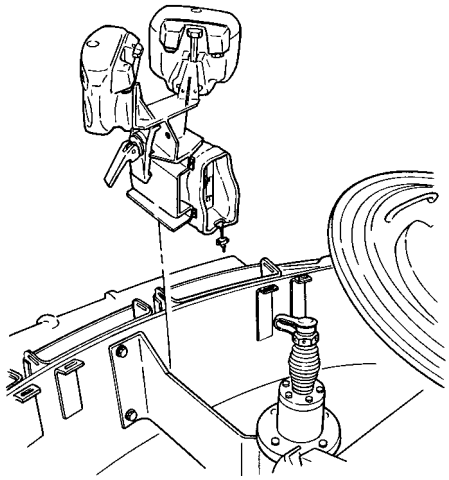
(2) Connect front HDDU assembly cable connector J2 to front RDU assembly connector J2.



2-3. INSTALLATION OF EXTERIOR COMPONENTS (Con't).

d. **TCU/RDU Assembly Installation.**

Install TCU/RDU assembly on turret center support.



2-3. INSTALLATION OF EXTERIOR COMPONENTS (Con't).

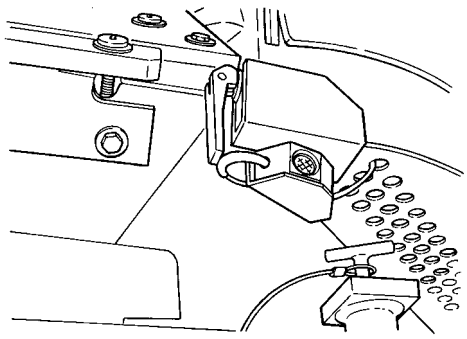
e. **Installation of HDDU Assembly (Right- and Left-Rear).**

NOTE

Right- and left-rear HDDU assemblies are installed the same way. Perform is procedure for both HDDU assemblies.

(1) Lift locking handle and position rear HDDU assembly on rear of turret bustle rack.

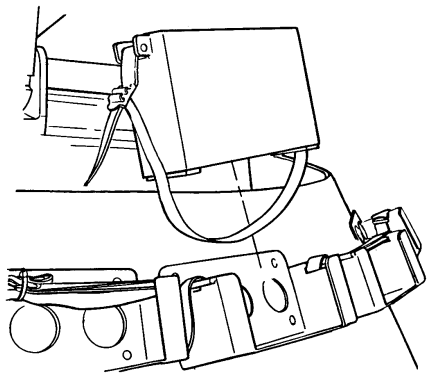
(2) Connect rear HDDU assembly cable connector J2 to rear RDU assembly connector J2.



2-3. INSTALLATION OF EXTERIOR COMPONENTS (Con't).

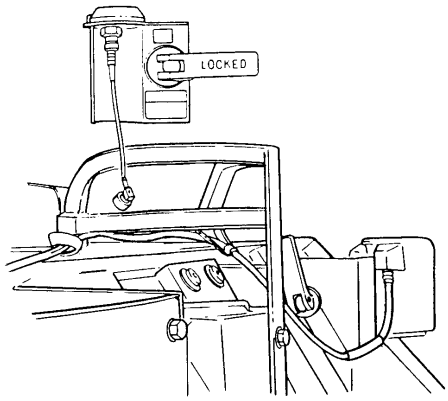
f. **Installation of RSI Assembly.**

Install RSI assembly in ammunition box storage bracket located at rear of turret (third from left).



g. **Installation of RSI Antenna Assembly.**

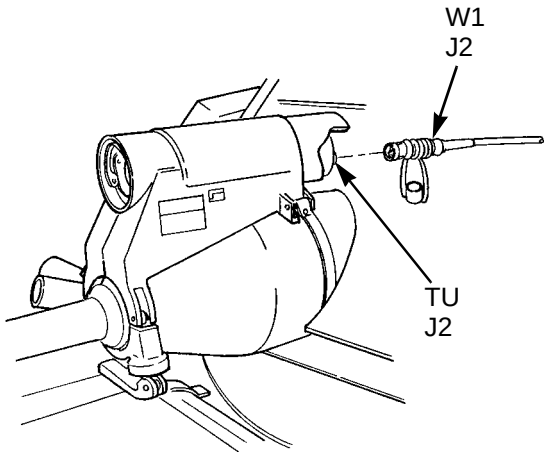
Install RSI antenna assembly on rear of vehicle antenna protective guard.



2-4. INSTALLATION OF EXTERIOR CABLES.

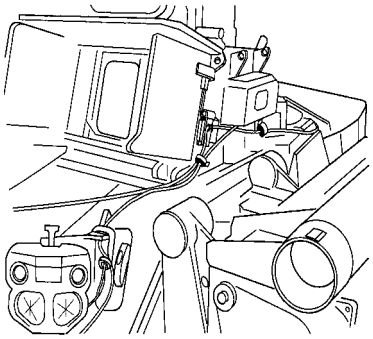
a. **W1 Cable Installation.**

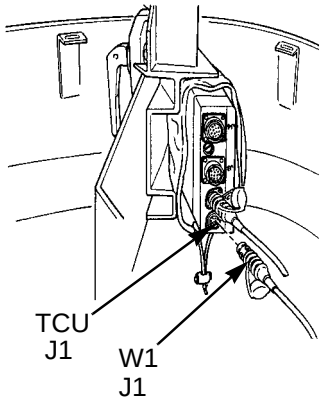
(1) Connect W1 cable connector J2 to transceiver unit connector J2.



2-4. INSTALLATION OF EXTERIOR CABLES (Con't).

(2) Route W1 cable along left side of turret. Connect W1 cable connector J1 to TCU connector J1.

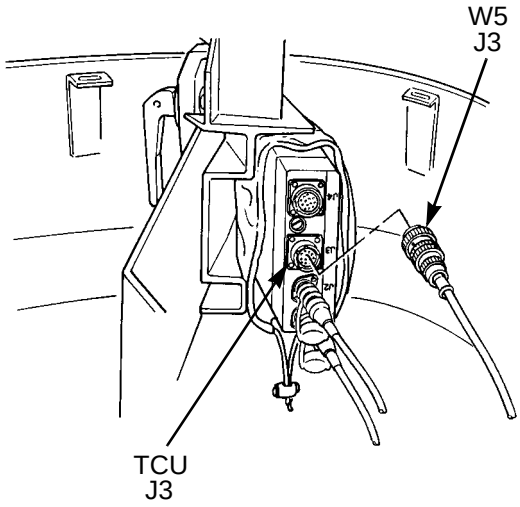




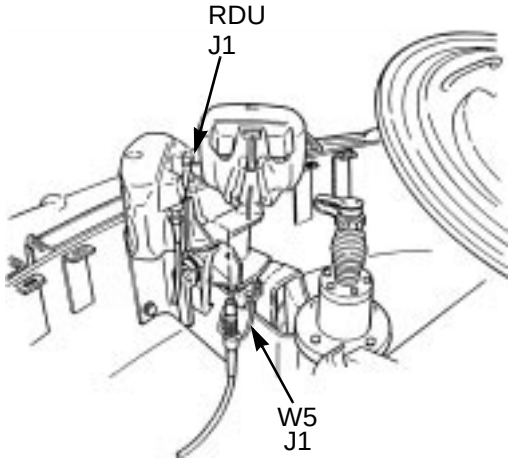
2-4. INSTALLATION OF EXTERIOR CABLES (Con't).

b. **W5 Cable Installation.**

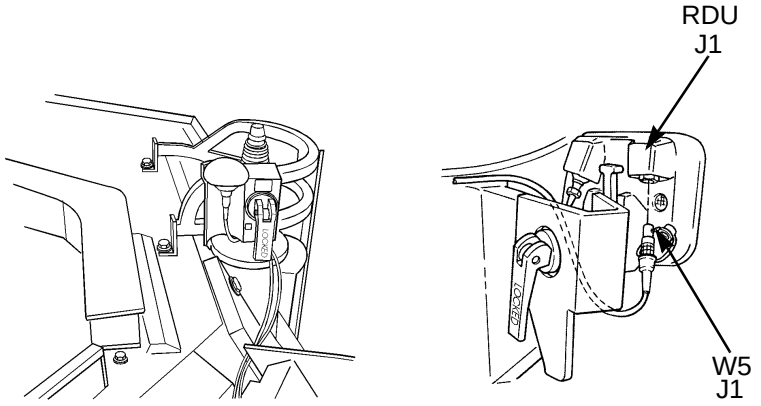
(1) Connect W5 cable connector J3 to TCU connector J3.



(2) Route short lead of W5 cable to right-rear RDU. Connect W5 cable connector J1 to right-rear RDU connector.

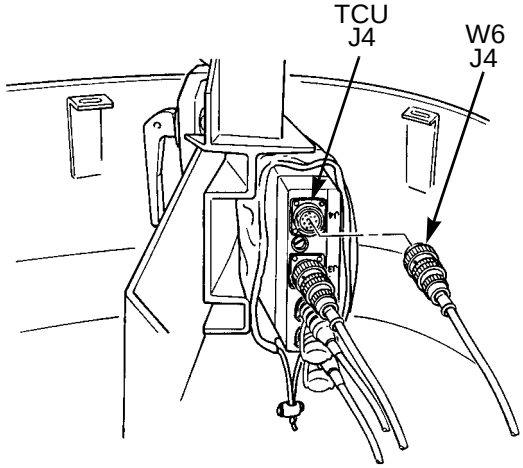


(3) Route long lead of W5 cable along right side of turret, to inside of antenna mount, and to right-front RDU. Connect W5 cable connector J1 to right-front RDU connector J1.



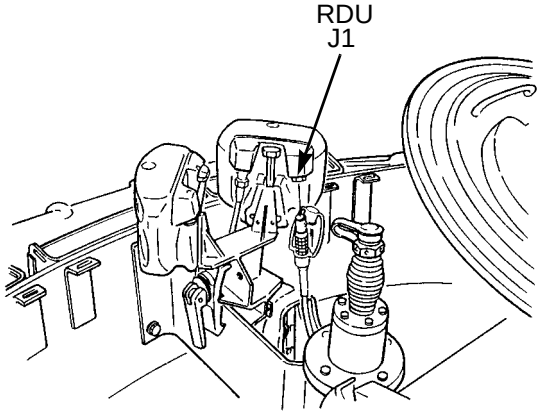
c. **W6 Cable Installation.**

(1) Connect W6 cable connector J4 to TCU connector J4.

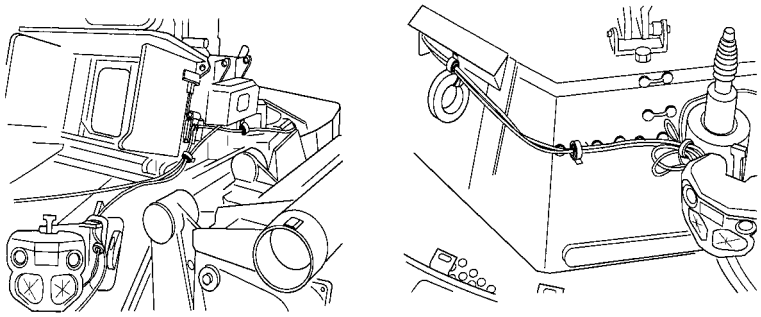


2-4. INSTALLATION OF EXTERIOR CABLES (Con't).

(2) Route short lead of W6 cable to left-rear RDU. Connect W6 cable connector J1 to left-rear RDU connector J1.



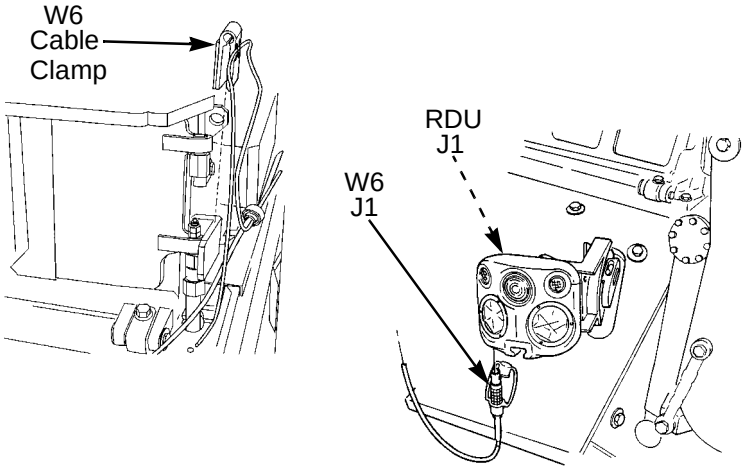
(3) Properly route cables at the rear of the turret.



CAUTION

Properly route W1 and W6 cables to ensure they clear the TOW launcher. Failure to do so may result in damaged cables.

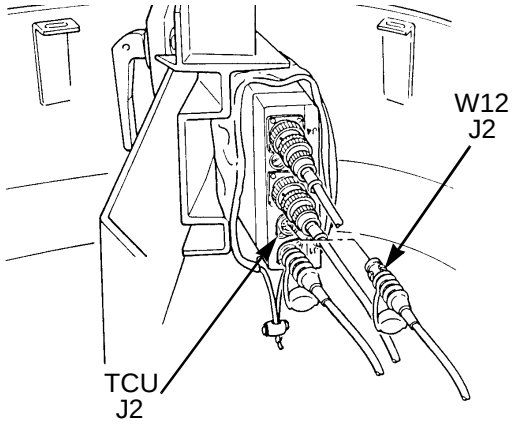
(4) Route long lead of W6 cable along left side of turret to left-front RDU. Connect W6 cable connector J1 to left-front RDU connector J1.



(5) Attach W6 cable clamp to left ballistic door stop.

d. **<u>W12 Cable Installation</u>.**

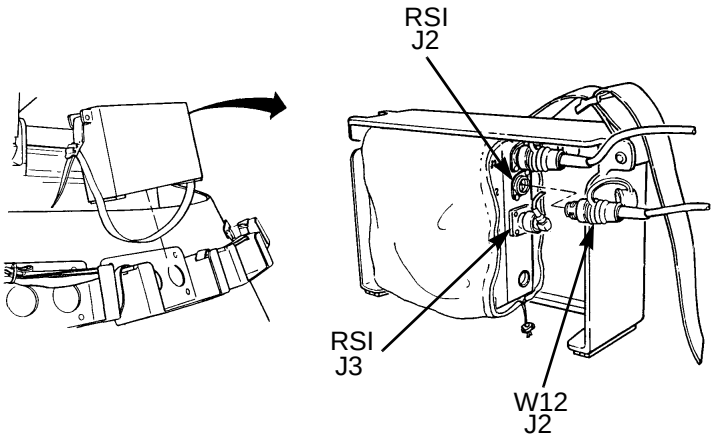
(1) Connect W12 cable connector J2 to TCU connector J2.



2-4. INSTALLATION OF EXTERIOR CABLES (Con't).

(2) Connect W12 cable connector RSI J2 to RSI unit connector J2.

(3) Secure RSI assembly with retaining strap.



(4) Route RSI antenna cable to RSI assembly.

(5) Connect RSI antenna cable connector to RSI unit connector J3.

2-5. INSTALLATION OF INTERIOR COMPONENTS.

WARNING

Vehicle master switch and turret power must be OFF and turret drive lock must be in LOCKED position before connecting or disconnecting system components/ cables. Failure to follow this warning may cause turret or 25 mm gun movement, resulting in injury or death to personnel.

CAUTION

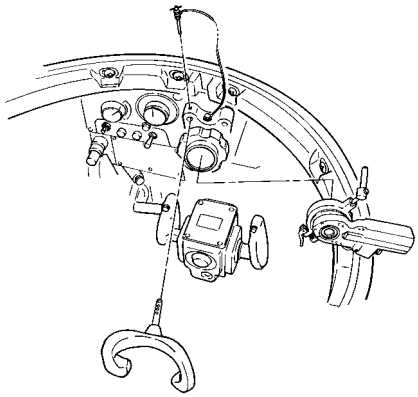
Prior to installation, inspect all cable connectors for damage, bent pins, and foreign objects. Failure to follow this caution may result in damage to vehicle or equipment.

a. **<u>TBOS Gunner's Eyepiece Installation</u>.**

(1) Position TBOS gunner's eyepiece on gunner's sight with stud placed into brow pad bracket.

(2) Lock TBOS on the gunner's sight.

(3) Install replacement brow pad to brow pad bracket.



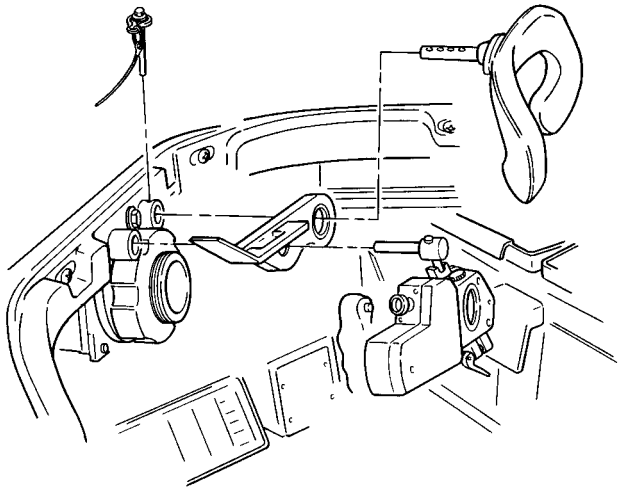
2-5. INSTALLATION OF INTERIOR COMPONENTS (Con't).

b. **TBOS Commander's Eyepiece Installation.**

(1) Position eyepiece shield and TBOS commander's eyepiece on commander's sight with stud placed through eyepiece shield and into brow pad bracket.

(2) Lock TBOS on the commander's sight extension.

(3) Install replacement brow pad to brow pad bracket.



2-5. INSTALLATION OF INTERIOR COMPONENTS (Con't).

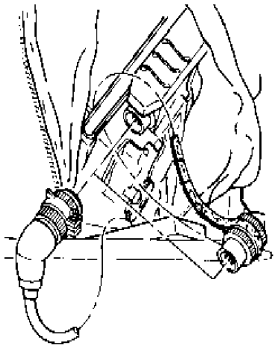
c. **Shorting Plug.**

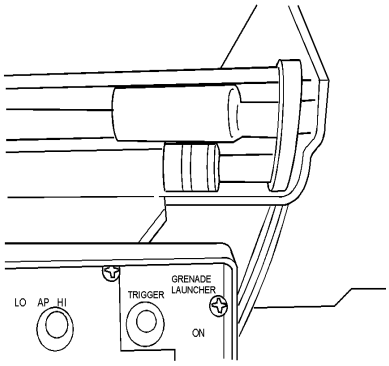
(1) Open 25 mm gun guard and cover (see TM 9-2350-10-2 or TM 5-2350-284-10-2).

(2) Disconnect connector from 25 mm gun power connector.

(3) Connect shorting plug to connector and secure shoring plug to vehicle with velcro strap.

(4) Close 25 mm gun cover and guard (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

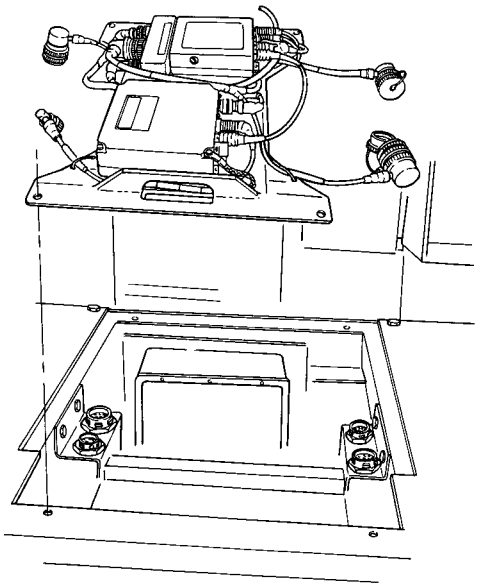




2-5. INSTALLATION OF INTERIOR COMPONENTS (Con't).

d. **Vehicle Interface Assembly Installation.**

Position vehicle interface assembly on vehicle floor.

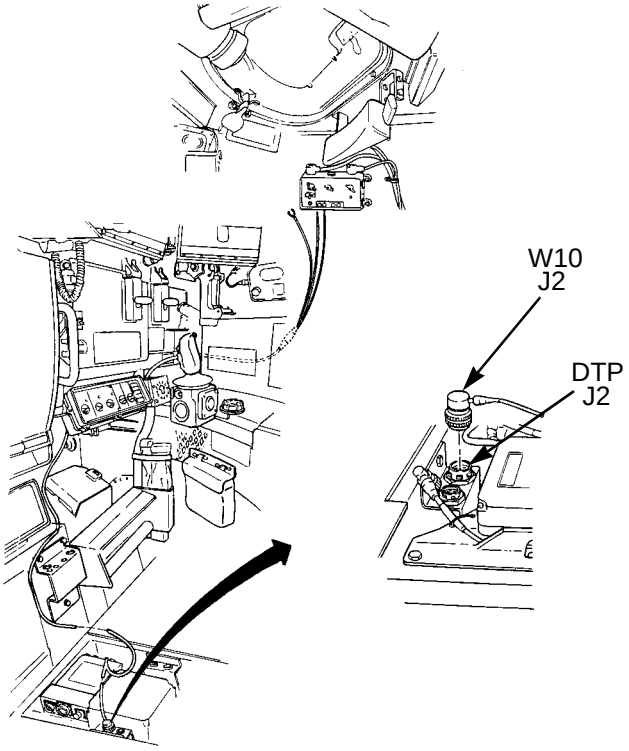


2-6. INSTALLATION OF INTERIOR CABLES.

a. **W10 Cable Installation.**

(1) Connect W10 cable assembly connector J2 to DTP connector J2.

(2) Route W10 cable assembly around tool case, under turret control box, to turret position indicator (TPI), and behind coax ammo boxes to vehicle.



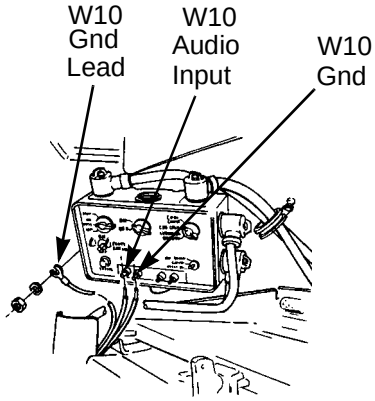
2-6. INSTALLATION OF INTERIOR CABLES (Con't).

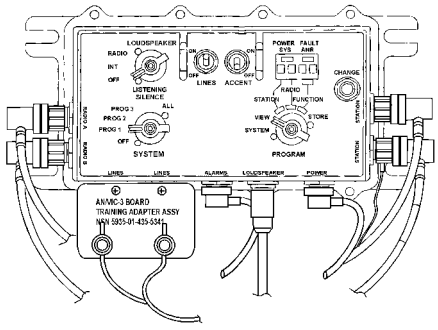
NOTE

When using the AN/VIC-3(V), install training adapter to MCS amplifier terminals. Install W10 cable audio input and audio ground leads to corresponding connection on training adapter.

(3) Connect W10 cable audio input and ground cable leads to amplifier terminals.

(4) Connect W10 cable ground lead on vehicle intercom.



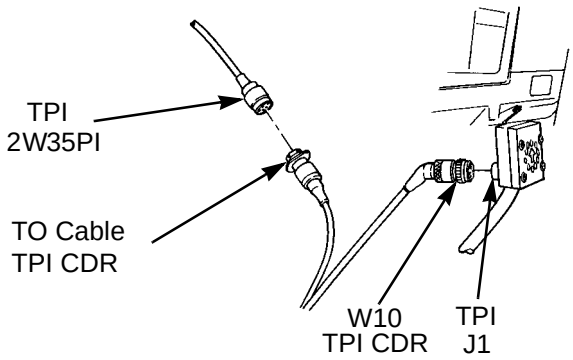


2-6. INSTALLATION OF INTERIOR CABLES (Con't).

(5) Disconnect TPI vehicle cable connector 2W35PI from TPI connector J1.

(6) Connect W10 cable connector W10 TPI CDR to TPI connector J1.

(7) Connect W10 cable connector TO CABLE TPI CDR to TPI vehicle cable connector 2W35PI.

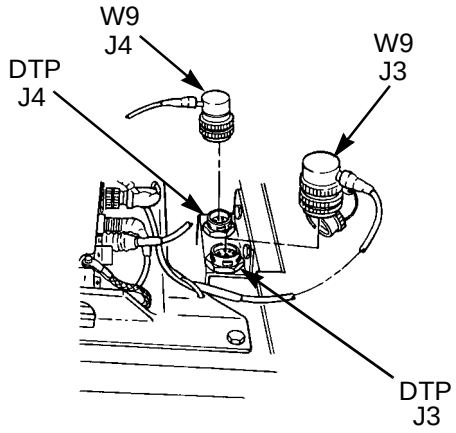


2-6. INSTALLATION OF INTERIOR CABLES (Con't).

b. **W9 Cable Installation.**

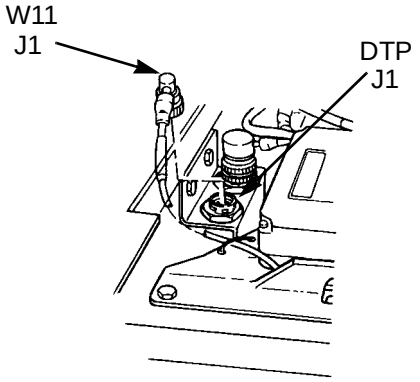
(1) Connect W9 cable connector J4 to DTP J4.

(2) Connect W9 cable connector J3 to DTP J3.



c. **W11 Cable Installation.**

Connect W11 cable connector J1 to DTP J1.



2-6. INSTALLATION OF INTERIOR CABLES (Con't).

d. **Control Panel and TDRS Memory Card Installation.**

(1) Connect CP cable connector J1 to VIU connector J1.

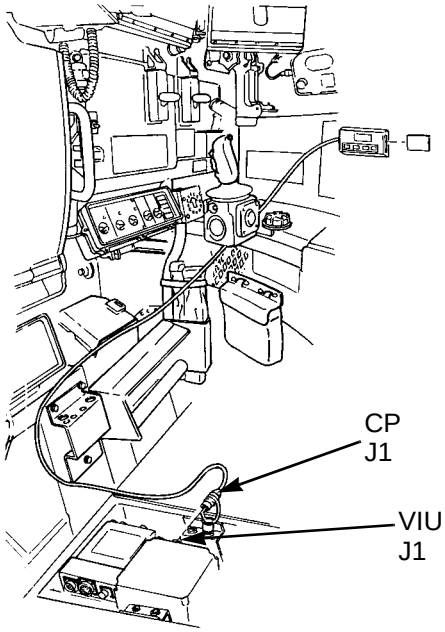
(2) Install TDRS memory card in CP.

(3) Route CP cable around tool case to right side of turret.

NOTE

M2/M3 basic BFV must use bracket in PGS kit to mount CP to coax ammo box.

(4) Install CP on coax ammo box.

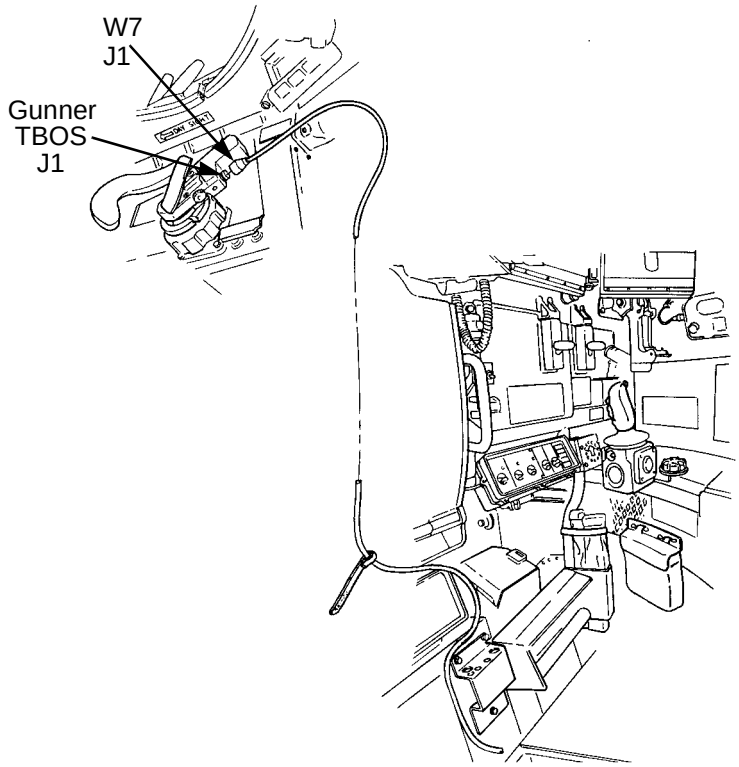


2-6. INSTALLATION OF INTERIOR CABLES (Con't).

e. **W7 Cable Installation.**

(1) Route W7 cable up around tool case, along bottom of weapon control box and up along left side of 25 mm gun guard to gunner's TBOS.

(2) Connect W7 cable assembly connector J1 to TBOS gunner's eyepiece unit connector J1.

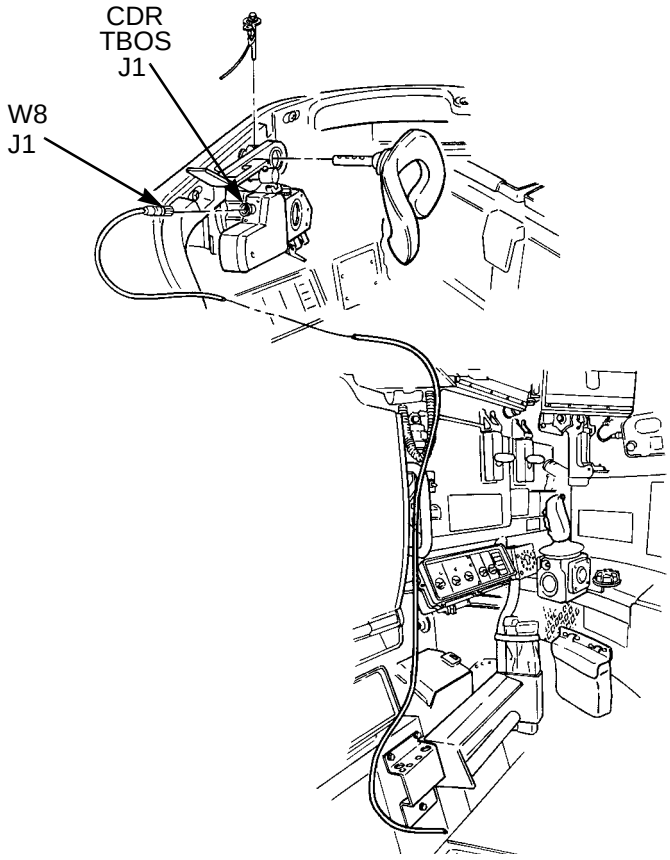


2-6. INSTALLATION OF INTERIOR CABLES (Con't).

f. **W8 Cable Installation.**

(1) Route W8 cable up around tool case, along right side of 25 mm gun guard to commander's TBOS.

(2) Connect W8 cable connector J1 to TBOS commander's eyepiece unit connector J1.

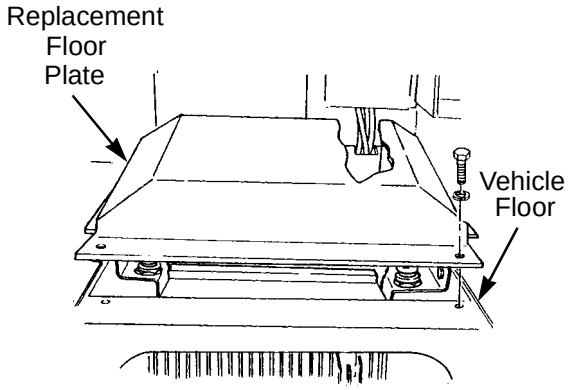


2-6. INSTALLATION OF INTERIOR CABLES (Con't).

g. **Replacement Floor Plate Installation.**

(1) Position replacement floor plate on vehicle floor with cable cut-out facing right-front.

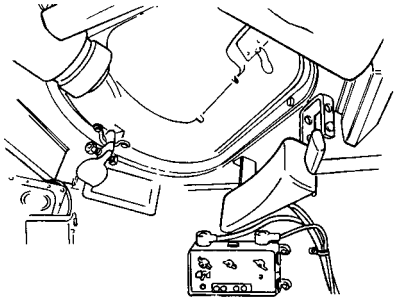
(2) Install four lockwashers and screws on replacement floor plate and vehicle floor.

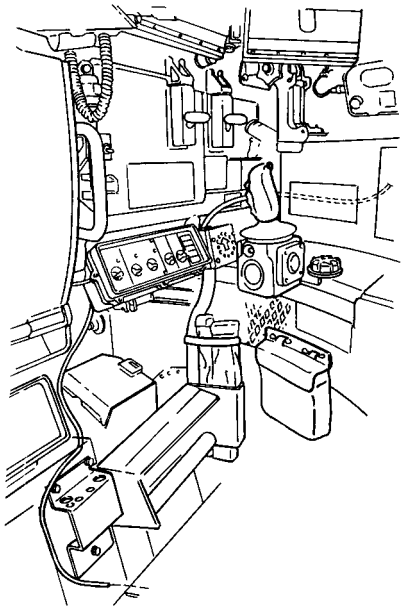


2-6. INSTALLATION OF INTERIOR CABLES (Con't).

h. **W2 Cable Installation.**

(1) Route W2 cable around tool case, under turret control box, to TPI, and behind coax ammo boxes.

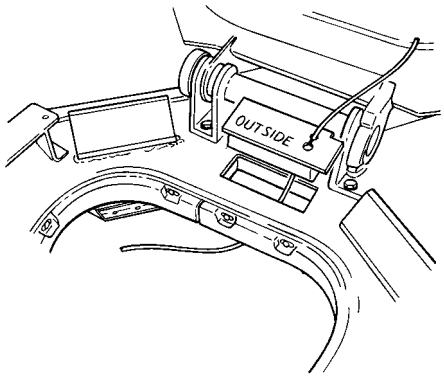




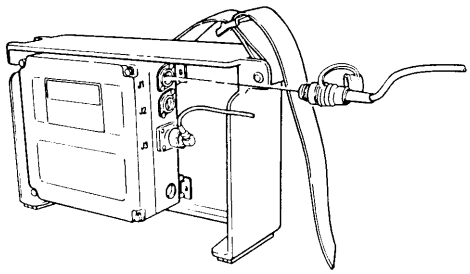
2-6. INSTALLATION OF INTERIOR CABLES (Con't).

(2) Route W2 cable out of turret through hole in periscope plug grommet.

(3) Install periscope plug grommet in turret.



(4) Connect W2 cable connector RSI J1 to RSI unit connector J1.



2-7. ALIGNMENT PROCEDURES.

NOTE

Alignment MUST be performed in strict accordance with instructions provided to ensure proper training results.

a. **Alignment Target Placement.**

(1) Position a target panel as close to 1200 meters away from the vehicle as possible. Target panel should be placed so that 25 mm gun is over the front of the vehicle when gun is aligned with target.

(2) Mount a retro reflector unit on the target panel.

b. **Vehicle Preparation.**

(1) Place vehicle master power switch in ON position (see TM 9-2350-252-10-1 or TM 9-2350-284-10-1).

(2) Place turret power switch in ON position (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(3) Place turret drive switch in ON position (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(4) Position vehicle so that slope indicator or inclinometer indicates vehicle is level within 5° slope (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(5) Release locking handle of TBOS commander's and gunner's eyepiece unit (see paragraph 2-5). Focus sight picture in commander's and gunner's eyepiece (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2). Lock locking handle of TBOS commander's and gunner's eyepiece units.

c. **TOW Alignment.**

(1) Using up/down arrow buttons, select AT and press ENTER.

NOTE

When AT is selected and ENTER is pressed to select an alignment submenu, the following pop-up screens appear. Ensure that the information on the pop-up screen matches vehicle setup prior to aligning system. Press ENTER to continue after each setting.

(2) Place turret drive switch in POWER MODE (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(3) Select high magnification on integrated sight unit (ISU) (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(4) Press ENTER to continue.

(5) Raise TOW launcher (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(6) Press ENTER to continue.

(7) Select TOW on TOW control box (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(8) Select TUBE1 on TOW control box (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(9) Press ENTER to continue.

d. **Cant Alignment.**

(1) Place weapon control panel ARM-SAFE-RESET switch in ARM position (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(2) Rotate turret until slope indicator bubble is positioned inside inner blue circle (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(3) Select CA and press ENTER.

NOTE

- **Cant angle of transceiver unit is displayed on control panel.**
- **If CANT OK is not displayed, cant alignment is NOT complete.**

(4) Have crewmember lower transceiver unit locking handle and slowly rotate transceiver unit until control panel displays cant angle of 0° ±0.5° and CANT OK is displayed.

CAUTION

Ensure that transceiver unit is properly LOCKED into mounting bracket. Failure to perform this check may result in transceiver unit falling out of mounting bracket and becoming damaged.

(5) Have crewmember raise transceiver unit locking handle to locked position.

(6) Press ESC.

e. **Laser Alignment (TOW).**

WARNING

Transceiver unit is a laser safety Class 3A which means it is conditionally eye safe.

(1) Select LA and press ENTER.

(2) Using gunner's controls, lay the TOW reticle on the center of the retro reflector unit mounted on the target panel.

(3) Select R and press ENTER.

NOTE

- **DO NOT adjust lay of gun at any time when performing steps 4 and 5.**
- **Ensure that only one retro reflector unit is visible within field of view.**

(4) Select M and press ENTER.

(5) Press ENTER a minimum of three times.

NOTE

If SAVE is selected prior to three laser measurements, a pop-up screen appears.

(6) Select S and press ENTER.

NOTE

If ESC is pressed while a pop-up screen is displayed, measurement is not saved. A pop-up screen appears.

(7) Press ESC.

f. **TBOS Gunner Alignment (TOW).**

(1) Select a target with a dark background to allow for better observation of TBOS effects.

(2) Select TG and press ENTER. A reticle pattern with alignment dot is presented in sight.

(3) Focus reticle pattern using TBOS gunner's eyepiece unit focus knob (1).

(4) Select R and press ENTER.

NOTE

When alignment (AL) is selected, TBOS alignment steps are displayed on the control panel.

(5) Select AL and press ENTER. Only a reticle pattern is presented in sight.

(6) Rotate reticle pattern until aligned with reticle using up/down arrow buttons.

NOTE

Reticle pattern is properly positioned when it rests over boresight cross. Shorter vertical line in reticle pattern MUST point downward.

(7) Press ENTER to save and continue alignment.

(8) Using up/down arrow buttons, adjust position of TBOS dot until dot is level with reticle aiming point.

(9) Press ENTER to save and continue alignment.

(10) Using left/right arrow buttons, adjust position of TBOS dot until dot is on reticle aiming point.

(11) Press ENTER to save.

NOTE

After ENTER is pressed, the TBOS alignment reticle is displayed. If not properly aligned with sight reticle, repeat steps 4 through 11.

(12) Press ESC.

g. **TBOS Commander Alignment (TOW).**

(1) Select a target with a dark background to allow for better observation of TBOS effects.

(2) Select TC and press ENTER. A reticle pattern with alignment dot is presented in sight.

(3) Focus reticle pattern using TBOS commander's eyepiece unit focus knob (1).

(4) Select R and press ENTER.

NOTE

When alignment (AL) is selected, TBOS alignment steps are displayed on control panel.

(5) Select AL and press ENTER. Only a reticle pattern is presented in sight.

(6) Using up/down arrow buttons, rotate reticle pattern until aligned with reticle.

NOTE

Reticle pattern is properly positioned when it rests over boresight cross. Shorter vertical line in reticle pattern MUST point downward.

(7) Press ENTER to save and continue alignment.

(8) Using up/down arrow buttons, adjust position of TBOS dot until dot is level with reticle aiming point.

(9) Press ENTER to save and continue alignment.

(10) Using left/right arrow buttons, adjust position of TBOS dot until dot is on reticle aiming point.

(11) Press ENTER to save.

NOTE

After ENTER is pressed, the TBOS alignment dot is displayed. If not properly aligned, repeat steps 4 through 11.

(12) Press ESC.

h. **Gun Alignment.**

(1) Select AG and press ENTER.

NOTE

When AG is selected and ENTER is pressed to select an alignment submenu, the following pop-up screens appear. Ensure that the information on the pop-up screen matches vehicle setup prior to aligning system. Press ENTER to continue after each setting.

(2) Place turret drive switch in POWER MODE (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(3) Select high magnification on ISU (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(4) Press ENTER to continue.

(5) Set ISU range knob to 0 meters (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(6) Press ENTER to continue.

(7) Select HE SS on weapon control box (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

(8) Press ENTER to continue.

i. **Laser Alignment (Gun).**

(1) Select LA and press ENTER.

(2) Using gunner's controls, lay aim point of 25 mm gun reticle on the center of the retro reflector unit, mounted on the target panel.

(3) Select R and press ENTER.

NOTE

- **DO NOT adjust lay of gun at any time when performing steps 4 and 5.**
- **Ensure that only one retro reflector unit and no other reflective objects are visible within field of view.**
- **The target hit deflection and range-to-target are displayed on the control panel display screen after pressing ENTER three times.**

(4) Select M and press ENTER.

(5) Press ENTER a minimum of three times.

NOTE

If SAVE is selected prior to three laser measurements, a pop-up screen appears.

(6) Select S and press ENTER

NOTE

If ESC is pressed while a pop-up screen is displayed, measurement is not saved. A pop-up screen appears.

(7) Press ESC.

j. **TBOS Gunner Alignment (Gun).**

(1) Select a target with a dark background to allow for better observation of TBOS effects.

(2) Select TG and press ENTER. A reticle pattern with alignment dot is presented in sight.

(3) Select R and press ENTER.

NOTE

When alignment (AL) is selected, TBOS alignment steps are displayed on control panel.

(4) Select AL and press ENTER. Only a reticle pattern is presented in sight.

(5) Using up/down arrow buttons, rotate reticle pattern until aligned with reticle.

NOTE

Reticle pattern is properly positioned when it rests over boresight cross. Vertical line in reticle pattern MUST point downward.

(6) Press ENTER to save and continue alignment.

(7) Using up/down arrow buttons, adjust position of TBOS dot until dot is level with reticle aiming point.

(8) Press ENTER to save and continue alignment.

(9) Using left/right arrow buttons, adjust position of TBOS dot until dot is on reticle aiming point.

(10) Press ENTER to save.

NOTE

After ENTER is pressed, the TBOS alignment reticle is displayed. If not properly aligned with sight reticle, repeat steps 3 through 10.

(11) Press ESC.

k. **TBOS Commander Alignment (Gun).**

(1) Select a target with a dark background to allow for better observation of TBOS effects.

(2) Select TC and press ENTER. A reticle pattern with alignment dot is presented in sight.

(3) Select R and press ENTER.

2-7. ALIGNMENT PROCEDURES (Con't).

NOTE

When alignment (AL) is selected, TBOS alignment steps are displayed on control panel.

(4) Select AL and press ENTER. Only a reticle pattern is presented in sight.

(5) Using up/down arrow buttons, rotate reticle pattern until aligned with reticle.

NOTE

Reticle pattern is properly positioned when it rests over boresight cross. Shorter vertical line in reticle pattern MUST point downward.

(6) Press ENTER to save and continue alignment.

(7) Using up/down arrow buttons, adjust position of TBOS dot until dot is level with reticle aiming point.

(8) Press ENTER to save and continue alignment.

(9) Using left/right arrow buttons, adjust position of TBOS dot until dot is on reticle aiming point.

(10) Press ENTER to save.

NOTE

After ENTER is pressed, the TBOS alignment dot is displayed. If not properly aligned, repeat steps 3 through 10.

(11) Press ESC.

2-8. SETUP PROCEDURES.

a. **Backlight.**

(1) Select SU and press ENTER.

2-8. SETUP PROCEDURES (Con't).

(2) Select BL. Press left arrow button to turn backlight ON or right arrow button to turn backlight OFF. Press ENTER.

(3) Press ESC.

b. **Contrast.**

(1) Select SU and press ENTER.

(2) Select CO and use left/right arrow buttons to change contrast and press ENTER.

(3) Press ESC.

Section II. OPERATION OF PGS

2-9. GENERAL.

NOTE

See TM 9-6920-710-12&P-1 for detailed information on TOW ONLY mode, scaled gunnery, aux-sight gunnery or tracking training.

a. This section describes operation of the Precision Gunnery System (PGS). The crew operates the vehicle weapons systems in their normal mode of operation and crew input to PGS is not required.

b. The PGS training exercise is set up by the instructor using the Training Data Retrieval System (TDRS) computer unit. The instructor sets the ammunition allowance and obscuration burn time. Refer to TM 9-6920-711-12&P-1.

c. Target engagement feedback is provided by the PGS in the form of audio tones and visual effects of tracer, burst, and obscuration. When simulating firing on a target vehicle, the appropriate sound signature will accompany the firing of the weapon. In the sight, the gunner can see the visual effects of firing obscuration, tracers, burst on target, and burst on ground. Listed below are the audio and visual effects provided during operation of the PGS.

2-9. GENERAL (Con't).

(1) Audio tones and control panel messages indicate to target vehicles that they are under fire or destroyed.

(2) Strobe lights indicate to firing vehicle that the target is hit or destroyed.

2-10. CREW OPERATIONS.

NOTE

- **During an upload sequence, PGS transfers a full amount of ammo in the box or remaining ammunition in hull.**
- **The remaining time of upload appears on control panel display screen.**
- **When ammunition has been uploaded, COMPLETED will appear on control panel display screen.**
- **Upload time is programmed on TDRS memory card by training controller.**
- **If ESC is pressed during an upload sequence, process is stopped and ammunition is not transferred.**
- **Crew must move turret to appropriate load position to reload turret ammunition.**

a. **Ammunition.** The crew can monitor remaining ammunition during an exercise using the control panel.

(1) Select SI and press ENTER.

(2) Select RM and press ENTER.

(3) To monitor main gun ammunition, select MW.

2-10. CREW OPERATIONS (Con't).

NOTE

Perform step (4) to upload main gun ammunition.

(4) Using up/down arrow buttons, select ammunition to be uploaded and press ENTER.

(5) To monitor coax ammunition, select CO and press ENTER.

NOTE

Perform step (6) to upload coax ammunition.

(6) Using up/down arrow buttons, select ammunition to be uploaded and press ENTER.

(7) To monitor missiles, select MI and press ENTER.

NOTE

Perform step (8) to upload missiles.

(8) Using up/down arrow buttons, select TOW to be uploaded and press ENTER.

(9) Press ESC.

2-11 RESULTS.

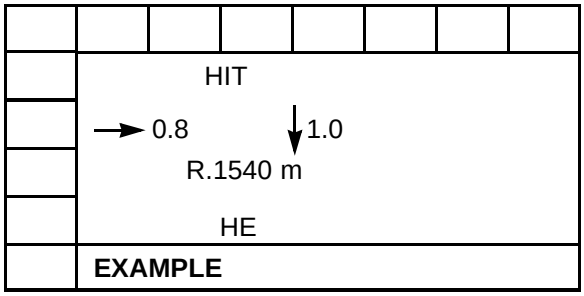
a. **General.** Results of the training exercise can be displayed numerically or graphically, or the result presentation can be turned off.

b. **Numerical Presentation.**

(1) Numerical presentation allows for immediate feedback and result presentation of hit coordinates and type of ammunition.

(2) Results are presented in a pop-up screen on the control panel.

(3) A pop-up screen appears until a new result is displayed or a control panel button is pressed.



c. **Graphics Display (GD).**

(1) Graphic presentation allows for immediate feedback and is used for panel gunnery training exercises where display of the hit in relation to the target outline is preferred over actual hit coordinates.

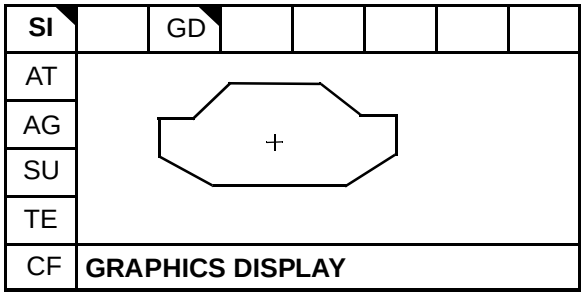
NOTE

This screen identifies the target silhouette and hit position (x) in relation to target center of mass (+).

2-11. RESULTS (Con't).

(2) Select SI and press ENTER.

(3) To view results graphically, select GD and press ENTER. Graphics display will show the target template of the ammo fired and round impact point.



(4) Press ESC to exit graphics display.

d. **Result Presentation Off.** For force-on-force exercises, the instructor can program the TDRS memory card to store the training results without displaying them on the control panel. This method of presentation requires the crew to engage their targets based on visual effects of tracers and burst provided in the sights.

2-12. DESCRIPTION OF HIT RESULT.

a. PGS provides results for firing vehicles and target vehicles.

b. A firing result provides information in four areas:

(1) Engagement evaluation.

(a) **HIT.** A HIT presentation indicates that the simulated round has hit the target. PGS assumes the target to be either a T80 Frontal (NATO standard size) for the TOW missile, BMP frontal for a 25 mm gun round, or a kneeling soldier for coax rounds. If the control panel indicates HIT, MILES codes are transmitted to enable the laser target interface device (LTID) to indicate.

2-12. DESCRIPTION OF HIT RESULT (Con't).

(b) **GROUND HIT.** A GROUND HIT presentation indicates that the ammunition has fallen short or long. The range for the actual ground impact is presented.

(c) **MAX RANGE.** If the control panel indicates MAX RANGE, the ammunition has not passed a target within the transceiver unit field of view, or has passed above the target and reached the maximum simulated range of the ammunition without landing on the simulated ground plane.

(d) **MISSILE ABORT.** If the gunner or commander aborts the missile, the CP displays a message and stores the information on the TDRS memory card.

(e) **MISSILE STALLED.** If during the guiding of the missile, the gunner or commander make a large/quick movement that makes the missile leave the guide corridor, the CP indicates MISSILE STALLED and this information is stored on the TDRS memory card.

(2) Elevation and azimuth impact point on target in relation to center of mass.

(3) Actual range, in meters, to target.

(4) Type of ammunition fired.

2-13. TARGET RESULT PRESENTATION.

A target result provides information in three areas:

a. Effect of incoming round on vehicle (target system evaluation).

(1) **NEAR MISS.** A projectile has passed close to the vehicle. The crew can continue to fight.

(2) **HIT.** The vehicle is hit, but not damaged. The crew can continue to fight.

2-13. TARGET RESULT PRESENTATION (Con't).

(3) **MOBILITY KILL.** The vehicle is damaged and immobilized by a hit. If the CP indicates MOBILITY KILL, the crew must stop vehicle within 30 seconds or the vehicle will be permanently killed. When a vehicle has suffered a mobility kill, the crew can continue to engage targets with their weapons from a stationary vehicle.

(4) **WEAPON KILL.** The vehicle is hit and the weapon system is damaged. The crew can move the vehicle, but cannot fire any weapons.

(5) **KILL.** The vehicle is hit and has sustained a catastrophic kill. The crew cannot move the vehicle or fire any weapons.

b. Elevation and azimuth impact point on vehicle in relation to center of mass.

c. Aspect angle of incoming round. The aspect angle is divided into 12 sectors according to the clock.

2-14. AUDIO INDICATIONS.

a. **General.** The system uses sound to indicate to the crew that different events have taken place. The audio indications can be divided into firing system, target system, and system error audio indications.

b. **Audio Indications of Firing System.** During loading and firing of ammunition, the following audio indications are heard through the vehicle intercom:

(1) Firing of TOW missile.

(2) Firing of 25 mm gun.

(3) Firing of coax machine gun.

c. **Audio Indications of Target System.** When a PGS system is fired upon from other simulator- equipped vehicles, the vehicle intercom indicates that the vehicle is being fired upon.

NOTE

On newer systems, voice messages will follow audio "beeps".

(1) **NEAR MISS.** If the vehicle had a near miss, two "beeps" or two "beeps" followed by "Near Miss, Direct Fire" are transmitted on the vehicle intercom.

(2) **HIT (NO KILL).** If the vehicle is hit, but not killed, 4-6 "beeps" or 4-6 "beeps" followed by "Hit, Direct Fire" are transmitted on the vehicle intercom.

NOTE

If panel gunnery training is used, the target system is auto-activated after 5 seconds. The audio indication stops and the system is operational. The kill is stored on the TDRS memory card together with auto-activation for After Action Review (AAR).

(3) **HIT (MOBILITY KILL).** If the vehicle is hit and the target computer has determined that a mobility kill has occurred, 4-6 "beeps" or 4-6 "beeps" followed by "Hit Mobility" are transmitted on the vehicle intercom. In addition, the control panel informs commander of action to take.

(4) **HIT (WEAPON KILL).** If the vehicle is hit and the target computer has determined that a weapon kill has occurred, 4-6 "beeps" or 4-6 "beeps" followed by "Hit Firepower" are transmitted on the vehicle intercom. In addition, the control panel informs commander of action to take.

(5) **KILL.** A continuous tone for 30 seconds or "Vehicle Kill" followed by a continuous tone for 30 seconds is transmitted on the vehicle intercom.

d. **System Errors.** Audio indication is also provided for system errors.

2-15. VISUAL INDICATIONS OF SYSTEM.

The target system indicates the effect of an engagement with the retro detector unit strobe lights. The effect directs the gunner/commander's further engagement of the target. The following visual indications are given by the target system:

a. **NEAR MISS.** If a target receives a near miss, retro detector unit strobe light blinks 2 times.

NOTE

Weapon kill and mobility kill are also indicated with 2-6 indicators.

b. **HIT.** If the target is hit, but not killed, retro detector unit strobe light blinks 4-6 times.

NOTE

If panel gunnery training is used, the target system is auto-activated after 5 seconds. The indication stops and the system is operational.

c. **KILL.** If the target is hit and killed by a round or by a control gun (CGUN), retro detector unit strobe light blinks continuously until the system is reset by the CGUN.

d. **Weapon Firing Sequence.** The front RDU's will flash when the 25 mm or coax weapon are being fired.

APPENDIX A
TROUBLESHOOTING CHECKLIST

If you have difficulty operating PGS, take the time to perform the following checks before you decide that there is something wrong with your system.

- Make sure that you have the vehicle master power and turret power ON.
- Check that ARM-SAFE-RESET switch is in ARM position.
- Verify that the TDRS memory card is properly installed in CP.
- Verify that PGS malfunction indicator lights located on the VIU, TBOS driver unit, and TCU are blinking. If malfunction light is on but NOT blinking or is OFF, perform troubleshooting.
- Check all cable connections to ensure that they are tight.
- Check BIT error list by selecting TE on the CP and press ENTER. Correct errors or notify a trained PGS troubleshooter.
- Manually run BIT by selecting BT on the CPl and pressing ENTER. Correct errors or notify a trained PGS troubleshooter.
- Refer to TM 9-6920-710-12&P-1 for detailed troubleshooting procedures.

APPENDIX B
LIST OF ABBREVIATIONS

AAR . . . . . After Action Review
BFV . . . . . Bradley Fighting Vehicle
BIT . . . . . Built-In Test
CGUN . . . . . Control Gun
CP . . . . . Control Panel
DUD . . . . . Driver Unit Dual
DTP . . . . . Diagnostic Test Panel
HDDU . . . . . Hull Defilade Detector Unit
ISU . . . . . Integrated Sight Unit
LTID . . . . . Laser Target Interface Device
MILES . . . . . Multiple Integrated Laser Engagement System
PGS . . . . . Precision Gunnery System
PMCS . . . . . Preventive Maintenance Checks and Services
RDU . . . . . Retro Detector Unit
RRU . . . . . Retro Reflector Unit
RSI . . . . . Remote System Interface
TBOS . . . . . Tracer, Burst, Obscuration Simulator
TCU . . . . . Target Computer Unit
TDRS . . . . . Training Data Retrieval System
TPI . . . . . Turret Position Indicator
TSV . . . . . Thru-Sight Video
TWGSS . . . . . Tank Weapon Gunnery Simulation System
VIU . . . . . Vehicle Interface Unit